

DOCUMENT RESUME

ED 235 227

TM 830 649

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TITLE School-Related Attitudes and Their Redundancy with Academic Achievement.
PUB DATE Jun 83
NOTE 19p.; Paper presented at the Learned Societies Conference of the Canadian Society for the Study of Education (Vancouver, BC, June, 1983).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Achievement; *Affective Measures; Correlation; Elementary Education; Foreign Countries; Language Arts; Mathematical Concepts; Pretests Posttests; Reading Achievement; *Semantic Differential; *Student Attitudes; *Test Construction; Test Reliability; *Test Validity
IDENTIFIERS *School Attitude Scale for Children

ABSTRACT

The development of a modified semantic differential measure of school-related attitudes of grades 3-6 children is described and its validation involving 99 children is reported. Each of the four scales of this measure, Attitude Toward-School, -Language Arts, -Teachers, and -Arithmetic, was found to be unidimensional. Internal consistency estimates were in the range .89 to .97 for the two administrations. Canonical correlations of the pre- and post-attitude measures with respect to the June, 1980 and June, 1981 Canadian Tests of Basic Skills (CTBS) Vocabulary, Reading, Language Arts, Mathematics Concepts, and Mathematics Problem-Solving scores were .42 and .41. Redundancy analysis indicated that only small amounts of redundant variances were accounted for in the pre- and post-data sets. Results are discussed from measurement and instructional perspectives. (Author)

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ED235227

School-Related Attitudes and their Redundancy
with Academic Achievement¹

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Running Head: Attitudes and Achievement

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¹A paper presented at the Learned Societies Conference of the
Canadian Society for the Study of Education,
Vancouver, June, 1983.

TM 830 699

Abstract

The development of a modified semantic differential measure of school-related attitudes of grades 3 - 6 children is described and its validation involving 99 children is reported. Each of the four scales of this measure, Attitude Toward -School, -Language Arts, -Teachers, and -Arithmetic, was found to be unidimensional. Internal consistency estimates were in the range .89 to .97 for the two administrations. Canonical correlations of the pre- and post-attitude measures with respect to the June, 1980 and June, 1981 CTBS Vocabulary, Reading, Language Arts, Mathematics Concepts, and Mathematics Problem-Solving scores were .42 and .41. Redundancy Analysis indicated that only small amounts of redundant variances were accounted for in the pre- and post-data sets. Results are discussed from measurement and instructional perspectives.

School-Related Attitudes and their Redundancy
with Academic Achievement¹

The importance of affective factors in the teaching-learning process is being increasingly recognized (Bloom, 1976; Epstein & McPartland, 1976; Glasman & Biniaminov, 1981; Smith & Glass, 1980). With regard to the relationship between "affective entry characteristics" and pupil learning, Bloom (1976), for example, suggests:

...individuals vary in what they are emotionally prepared to learn as expressed in their interests, attitudes, and self-views. Where students enter a learning task with enthusiasm and evident interest, the learning process should be much easier, and, other things being equal, they should learn it more rapidly and to a higher level of attainment or achievement than will students who enter the learning task with a lack of enthusiasm and evident disinterest. (p. 74)

Reflecting this increasing interest in the affective dimensions of the pupil's school experience is a growing body of research pertaining to attitudes toward school in general (Gable, Roberts, & Owen, 1977; Haladyna & Thomas, 1979; Khan, 1978; Meier & McDaniel, 1974; Perney, 1975; Roshal, Frieze, & Wood, 1971) and attitudes toward various school subjects and activities, such as reading (Askov & Fischbach, 1973; Brown, Engin, & Wallbrown, 1979; Engin, Wallbrown, & Brown, 1976; Roettger, Szymczuk, & Millard, 1979; Tullock-Rhody & Alexander, 1980) and mathematics (Aiken, 1970, 1976; Michaels & Forsyth, 1977; Pedro, Wolleat, Fennema, & Becker, 1981).

A variety of methodologies have been developed for the assessment of attitudes (Cook & Selltiz, 1964). Among the more promising of these

methodologies for the assessment of school-related attitudes is the semantic differential technique (Osgood, Suci, & Tannenbaum, 1957). Judging from the literature, it would appear that most of the research using this approach to assessing school-related attitudes has focused upon adolescents and adults (Cassel, 1970; Hoste, 1981; McCallon & Brown, 1971; Rothman, 1968; Thompson & Stapleton, 1980; Young, 1974). One reason for this state of affairs may be that formidable problems of scale validity and reliability emerge when the semantic differential technique is employed with young children. While some progress has been made in extending the application of the semantic differential approach to the measurement of school-related attitudes at the elementary school level (Scharf, 1971; Wilson, Stuckey, & Langevin, 1972; Yamamoto, Thomas, & Karns, 1969), more research needs to be done to develop valid and reliable semantic differential scales suitable for young children. The present study, therefore, deals with: (1) describing the development and make-up of a semantic differential measure of school-related attitudes for young children; (2) presenting evidence for the reliability and validity of the measure; (3) relating school-related attitudes to academic achievement; and (4) discussing issues pertaining to the measurement of school-related attitudes in the context of instructional theory and practice.

Method

Sample: A total of 99 students in grades 3, 4, 5 and 6 from two mid-western Canadian city elementary schools were the subjects in the present study. There were 55 boys and 44 girls.

Instruments: Modified Semantic Differential Scales. The School Attitude Scale for Children (SASC) consists of four modified semantic differential scales which tap the following school-related dimensions: School, Language Arts, Teachers, and Arithmetic. The scales are designated

as modified because they were developed through use of a combination of semantic differential and likert scale methodologies. The general format of the modified semantic differentials is the same as that developed by Scharf (1971) in the context of measuring attitudes of elementary school children toward mathematics. However, the present instrument differs from the instrument developed by Scharf (1971) in that it utilizes a larger number of bi-polar adjective pairs and incorporates a greater variety of school-related attitude objects.

Each of the four scales was designed such that a particular attitude object was followed by the following predominantly evaluative bi-polar adjective pairs (Osgood, et al., 1957; Shaw and Wright, 1967): kind-cruel, clean-dirty, good-bad, happy-sad, beautiful-ugly, honest-dishonest, strong-weak, fair-unfair, interesting-boring, and nice-awful. These adjective pairs were used to designate the poles of five-point semantic differentials, with the underlined adjectives appearing on the left-hand side of each scale. The five points were described through use of the descriptors "very," "sort of," "neither," "sort of," and "very."

Achievement Measures. Scores on the Canadian Tests of Basic Skills (CTBS), available from the schools for the June, 1980 and June, 1981 administrations on Vocabulary, Reading, Language Arts, Mathematics Concepts and Mathematics Problem Solving, were used in the present investigation (King, 1976).

Procedures: All the grade 3 to 6 children in the two schools in their respective classrooms were administered the SASC during the period of September 23 to October 1, 1980 and again during the period of May 20 to 29, 1981. The SASC scales were placed in booklets in a random order. Before the school-related attitude scales were administered, pupils were given detailed

general instructions and provided with an opportunity to practice the responding procedure relative to a non-school-related attitude object.

Care was taken to ensure that pupils, particularly those at grade levels three and four, understood the general meaning of the attitude objects. Descriptions of selected attitude objects which were anticipated to pose interpretive difficulties were developed with the assistance of an experienced elementary school teacher and consistently used in administering the scales.

Analysis, Results, and Discussion

The iterative principal factor analysis of the 10x10 correlation matrix for each scale and testing occasion indicated that items of each of the SASC scales had only one parsimonious factor. These results confirmed the unidimensionality of each of the attitude scales in the SASC for both administrations.

Cronbach alpha internal consistency estimates for the pre- and post-SASC measures and the correlation matrices of the nine pre- and post-scores are given in Table 1. The pretest internal consistency estimates for the

Insert Table 1 about here

four SASC measures were in the range .89 to .92 and the post-test estimates were in the range .95 to .97. These estimates for the ten item scales are quite high and indicate that these scales consist of items which were responded to by each subject in a highly consistent manner. Stability coefficients of the School, Language Arts, Teachers and Arithmetic scales were, respectively, .57, .34, .56, and .51. With the exception of the Language Arts scale, the attitude scales demonstrated reasonable stability in

terms of the manner in which the subjects responded at the beginning and the end of the eight-month time span.

The 9x9 correlation matrices for the pre- and post-measures were factor analyzed using the principal factor procedure with iterations and the obtained solutions were rotated orthogonally to the varimax criterion. In each case, two well-differentiated factors were obtained. These varimax factors for the two sets of measures are given in Table 2. As can be seen in this table, Factor I is defined by the five CTBS tests and Factor II is defined by the SASC measures. These two distinct factors in each case may

Insert Table 2 about here

suggest that the attitude and achievement measures have inherently different underlying response mechanisms. That this, in fact, is the case is somewhat apparent from what Krathwohl, Bloom, and Masia (1964) stated. They suggested that "affective behaviors develop when appropriate learning experiences are provided for students much the same as cognitive behaviors develop from appropriate learning experiences" (p. 20). However, all the negative and low correlations of the achievement measures with the SASC measures in the two sets of measures are in contradiction to what has extensively been reported, low positive correlation of achievement with the corresponding attitudinal measure (Aiken, 1976; Bloom, 1976; Gable, Roberts, & Owens, 1977; Roettger, Szymczuk, & Millard, 1979). It is generally believed that effective instructional programs are such that students achieve optimally in the academic subjects and that students come out of these programs feeling positive about the instructional activities and the subject matter. In the present case, this would not appear to have happened, even though the average

academic attainment of the students in both mathematics and language arts was typical of students in the school district. Some speculation concerning these unexpected findings is in order. It is possible that, despite the efforts made to clarify the meaning of attitude objects and correct responding procedures, pupils nevertheless may have experienced difficulty in interpreting the attitude scales. Alternatively, it could be that, despite the stability of student attitudes over the eight-month time span and the systematic monotonic decrease in the positiveness of student attitudes as students progress through grade structure, the low-positive correlation of attitudes with corresponding school achievement measures may be a transient phenomenon.

The unexpected findings reported here point to a need to critically examine commonly held assumptions regarding the relationship between school-related attitudes and academic achievement. It would also appear desirable to further examine the attitude-achievement relationship in terms of the measures employed in this study with a larger sample of children from each grade.

As it has been shown that attitude and achievement measures have distinctive underlying response mechanisms, it was expected that the two sets of measures would share markedly small common variance. A canonical correlation and redundancy analysis (Cooley & Lohnes, 1971) was carried out on both pre- and post-sets of data to find this out. Only one significant canonical correlation was obtained for the pre- and post-data sets. These were, respectively, .42 and .41. These markedly similar and significant canonical correlation coefficients could be misinterpreted if one suggests that achievement and attitude measures therefore have approximately 17% (r_c^2) of common or redundant variance. In fact, Bloom (1976) suggests a similar

proportion of variance in achievement that can be predicted from affective measures. Perhaps it is due to such a misinterpretation of previous research data in the literature that researchers have always expected a positive but low correlation between achievement and attitude/affective measures. The correct index in such analysis is the redundancy coefficient.

Another possible confusion when using the canonical correlation analysis has been the manner of inferring variables that may define a particular canonical factor. Such inferences were usually made on the basis of high raw or standardized canonical weights in each set of variables used in an analysis. The correct procedure is to produce the structure coefficients, the correlation of a variable with the canonical factor, for each variable and factor. Therefore, in the present research, structure coefficients for the variables in each set for the two testing occasions were produced and the redundancy coefficients for each factor were also obtained. These are reported in Table 3. For the pretest variables, all five of the achievement

Insert Table 3 about here

measures were significantly correlated with the canonical factor. On the other hand, it seems that all of the scales, except the Arithmetic scale, defined the canonical factor for the attitude measures. The redundancy of the achievement measures with the attitude measures as defined through the achievement canonical factor was approximately 7.0%. Similarly, the redundancy of the attitude measures with the achievement measures was 7.0%. Hence, the two sets of variables shared a modest and equivalent amount of redundant variance.

On the other hand, for the post-measures, although one significant canonical correlation was obtained, the Achievement factor was defined by all but the Mathematics Problems test and the Attitude factor was defined in a manner similar to the factor identified in the pre-measures. However, an interesting result of the redundancy analysis was that the redundancy of the two sets was, respectively, 2.0% and 2.3%. The reason why the redundancies of the post-measures were relatively smaller than the pre-measures is not clear. The fact remains, however, that achievement and attitude measures share a very modest amount of redundant variance.

A positive attitude toward a given learning domain (i.e., school subject) is probably only one of a host of individual difference variables that contribute to achievement in that domain. For example, in addition to attitude toward a subject, achievement is also affected by aptitude for the subject, possession of prerequisite knowledge, situational factors in a particular learning environment such as the adequacy of instructional procedures, and day-to-day variations with regard to such factors as physical and emotional well being. Given this state of affairs, it may well be quite unrealistic to expect a high degree of correlation between attitude toward a subject and achievement in that subject. Indeed, given the probably pervasive influence of individual difference variables of the type mentioned, it is somewhat surprising that the redundancy between attitude and achievement is as high as it appears to be on the basis of the present findings.

At the outset of this paper, Bloom (1976) was quoted as suggesting that "other things being equal", students who enter a learning task with a positive affective disposition toward the task should learn it more readily and to a higher level of proficiency. On the basis of the findings of the

present study, it would seem that, if the phenomenon of school achievement is to be more fully understood, these "other things" will need to be given as much attention as the attitudinal dimension of the learning process.

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Table 1

Cronbach Alpha Internal Consistency Estimates and Stability Coefficients
of SASC Measures and The Pre- and Post-Scores Correlation Matrices^a

Measure	1	2	3	4	5	6	7	8	9	Pre- test Alpha
1. CTBS Vocabulary	—	90	85	85	86	-10	-23	-24	-07	—
2. CTBS Reading	92	—	83	85	84	-06	-23	-21	-03	—
3. CTBS Language	85	86	—	82	85	-06	-11	-09	-06	—
4. CTBS Math Concepts	89	90	87	—	86	-14	-24	-23	-05	—
5. CTBS Math Problems	83	86	83	88	—	-09	-27	-21	-02	—
6. SASC School	-01	-04	-10	00	-03	57	73	71	68	89
7. SASC Language Arts	-19	-16	-11	-23	-15	69	34	67	55	90
8. SASC Teachers	-11	-14	-03	-15	-19	77	57	56	57	92
9. SASC Arithmetic	-11	-08	-08	-09	-04	60	51	54	51	92
Posttest Alpha	—	—	—	—	—	96	95	96	97	—

^aPretest and posttest correlations are above and below the diagonal respectively. Stability Coefficients of SASC Measures are in the diagonal. Decimal points are omitted.

Table 2

Varimax Factor Loadings and Communalities
for the Nine Pre- and Post-Measures^a

Variable	Pretest Factors			Posttest Factors		
	I	II	h^2	I	II	h^2
1. CTBS Vocabulary	94	-12	89	94	-07	88
2. CTBS Reading	92	-08	86	95	-06	91
3. CTBS Language	91	05	83	91	02	84
4. CTBS Math Concepts	91	-13	84	95	-10	91
5. CTBS Math Problems	92	-09	86	90	-09	82
6. SASC School	00	92	84	09	95	91
7. SASC Language Arts	-17	80	66	-13	73	55
8. SASC Teachers	-15	79	65	-08	80	65
9. SASC Arithmetic	04	73	53	-05	65	43
Total Common Variance	446	250	696	445	245	690
% Common Variance	6410	3590		6450	3550	

^aDecimals omitted and all values rounded off to the decimal places

Table 3

Structure Coefficients of the Variables and Redundancy Coefficients
of each Factor for the Two Testing Occasions

Pre-Measures			
Achievement Variables	Factor 1	Attitude Variables	Factor 1
Vocabulary	-.60	School	.60
Reading	-.62	Language Arts	.84
Language Arts	-.37	Teachers	.69
Math Concepts	-.65	Arithmetic	.10
Math Problems	-.79		
Redundancy	7.0%		7.0%
Post Measures			
Achievement Variables	Factor 1	Attitude Variables	Factor 1
Vocabulary	-.38	School	-.46
Reading	-.30	Language Arts	-.08
Language Arts	-.51	Teachers	-.50
Math Concepts	-.33	Arithmetic	.26
Math Problems	.02		
Redundancy	2.0%		2.3%